



The Single-Dose Solution

Reducing the HPV Vaccine from Three Doses to One Could Dramatically Improve Global Immunization Rates

The first human papillomavirus vaccine, which was introduced in 2006, can prevent cervical precancer and other tumors in young women. Scientists, including those at the Frederick National Laboratory for Cancer Research, are now studying ways to make HPV vaccines accessible to more women worldwide and to determine how they may protect men against HPV-related cancers, as well.

HPV is the most common sexually transmitted infection. High-risk HPVs cause several types of cancer—approximately 5 percent of all cancers worldwide—including virtually all cases of cervical cancer. According to the International Agency for Research on Cancer, cervical cancer affects more than half a million women each year, with 88 percent of deaths occurring in low-income nations. Therefore, the need for an easily accessible vaccination strategy is a pressing global concern.

Although the vaccine is effective, in 2016 only 65 percent of U.S. girls ages 13–17 received at least one of the recommended three doses. HPV vaccine uptake has been even lower in developing countries, where there are significant barriers such as high costs and the logistical difficulties of ensuring that vaccinated individuals return for the additional doses.

Fortunately, there is mounting evidence that a single-dose HPV vaccine may protect against infection and cancer. And that one-time injection could dramatically improve vaccination uptake and cancer prevention worldwide.

Fewer Doses, Same Response?

Ligia Pinto, Ph.D., director of the Vaccine, Immunity, and Cancer Program and head of the HPV Immunology Laboratory at Frederick National Laboratory, studies how

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the immune system responds to fewer doses of the HPV vaccine by evaluating antibody responses in women who have received one, two, and three doses.

Her team's findings, part of the National Cancer Institute's large Phase III clinical trial known as the Costa Rica Vaccine Trial, suggested that a single dose of the HPV vaccine could provide stable immunity against two of the most common strains of HPV for at least four years following vaccination. In addition, a single dose of the vaccine proved to be as effective as two or three. The trial has since been extended, and a new randomized trial was recently initiated by NCI in Costa Rica to formally test the efficacy of a single-dose HPV vaccine.

"The main aim of my very passionate team is to bring our bench expertise and skills to the public, by providing scientific evidence and tools that can help make faster, informed decisions towards the use of new vaccine regimens, new vaccine formulations, and new anti-cancer targets," said Pinto.



Ligia Pinto, Ph.D.

Ligia Pinto leads the HPV Immunology Laboratory at the Frederick National Laboratory.

Men May Benefit, Too

Men also develop HPV-related cancer—they are nine times more likely than women to develop HPV-associated oral cancers. A study published by Pinto and colleagues from Moffitt Cancer Center and Weil Cornell Medicine showed that adult men living with HIV and men without HIV had a strong immune response to an HPV vaccine that protects against four strains of the virus. This information could lead to clinical trials to determine the effectiveness of the vaccine in men.

Pinto also established the HPV Serology Laboratory at the FNL to create tools that enable scientists to compare data across different HPV vaccines and different studies. In partnership with the NCI, CDC, the Bill and Melinda Gates Foundation, and others, Pinto's international initiative provides the scientific community with a standardized system to evaluate immune responses to HPV vaccines in clinical trials.

Collaborate with the Frederick National Laboratory

The Frederick National Laboratory for Cancer Research is a shared national resource whose mission is to enable solutions to biomedical research questions and overcome challenges to progress. We actively establish partnerships among our scientists and external researchers in government, academia, industry and the nonprofit research community.

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